

REMARKS

This response is intended as a full and complete response to the Final Office Action mailed on January 19, 2007. In view of the following amendment and discussion, the Applicants believe that all claims are in allowable form.

CLAIM REJECTIONS**35 U.S.C. §102****Claims 1-4, 6 and 8-12**

Claims 1-4, 6 and 8-12 stand rejected under 35 U.S.C. § 102(b) as being anticipated over *Xu* (EP 0758148). In response, the Applicants have amended claim 1 to more clearly recite certain aspects of the invention. Support for the amendment to claim 1 is provided in claim 18. As such, no new matter has been added or additional for additional search is required.

Independent claim 1 recites elements not taught or suggested by *Xu*. *Xu* teaches supplying a gas mixture into a chamber to deposit a TiN layer without collimated seed layer. The gas mixture is maintained in a space between the target and the substrate and reacts with the material sputtered from a target disposed in the chamber. However, *Xu* does not teach or suggest introducing a first gas into a vacuum chamber wherein the first gas is introduced through an first inlet port disposed proximate a sputtering target disposed inside the vacuum chamber, and introducing a second gas into the chamber to deposit the metal containing film layers, wherein the second gas is introduced through an second inlet port disposed and directed proximate to a surface of the substrate in the presence of a power applied to the sputter target and the coil, as recited by claim 1.

The Examiner asserts that the term “proximate” is a relative term and introducing nitrogen gas into the chamber as taught by *Xu* would qualify as “proximate” to the substrate. The Applicants respectfully disagree.

Merriam-Webster's Collegiate Dictionary 10th Edition defines the term “proximate” as “very near”, “close” or “soon forthcoming”. As admitted by the Examiner, the term “proximate” is a relative term. However, the Examiner is interpreting each limitation separately and without context of the entire claim. Here, the Applicants have claimed both introducing a first gas proximate a target and a second gas proximate a surface of

a substrate. Thus, the phrases “proximate a target” and “proximate a surface of a substrate,” when read within the context of the entire claim, define separate locations within the processing chamber. Specifically, a first location wherein the first gas is introduced that is closer to (e.g., proximate) the target relative to where the second gas is introduced, since the second gas is introduced proximate the substrate.

In the present application, *Xu* does not teach or suggest different locations for gas injection. Moreover, *Xu* is silent regarding how and where the nitrogen gas may be introduced into the chamber. The Applicants clearly defines that a second gas is introduced into the chamber through a second inlet port disposed and directed proximate to a substrate surface. *Xu* does not teach, suggest, or define a particular location where and how to introduce nitrogen gas into the chamber as Applicants define.

The standard for claim interpretation during the examination of a patent application by the U.S. Patent and Trademark Office is that “claims ... are to be given their broadest reasonable interpretation consistent with the specification, and ... claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art.” Moreover, this interpretation must be consistent with one that would be reached by those skilled in the art. *In re American Academy of Science Tech Center*, 367 F.3d 1359, 1365; 70 U.S.P.Q. 2D (BNA) 1827 (Fed. Cir. 2004), citing *In re Bond*, 910 F.2d 831, 833 (Fed. Cir. 1990) and *In re Cortright*, 165 F.3d 1353, 1358 (Fed. Cir. 1999) (emphasis added). The Applicants submit that the Examiner interpreting the *Xu* reference over broadly, and as *Xu* would be interpreted by one of ordinary skill in the art. The Examiner takes the position that introducing nitrogen gas into the chamber as taught by *Xu* suggests the desirability of supplying nitrogen gas “proximate” to the substrate. However, *Xu* does not identify introducing a second gas into the chamber through a second inlet port disposed and directed “proximate”, “close”, and “near” a surface of the substrate as claimed by the Applicants. Furthermore, *Xu* does not teach or suggest introducing a first gas into a vacuum chamber wherein the first gas is introduced through a first inlet port disposed “proximate” a sputtering target disposed inside the vacuum chamber, as claimed by the Applicants. Thus, the Applicants submit that, one of ordinary skill, in light of the specification that describes

and illustrates different positions for gas injection locations, breathes meaning into the terms “proximate” to designate specific regions within the chamber that are identifiable and different than what is taught or suggested by the references of record.

“Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim.” *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984)(citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)). Here, as *Xu* does not teach or suggest introducing a first gas through an first inlet port disposed proximate a sputtering target and introducing a second gas into the chamber through an second inlet port disposed and directed proximate to a surface of the substrate, as recited in claim 1, *Xu* fails to disclose each and every element of the claimed invention recited by independent claim 1, and thus, a *prima facie* case of anticipation is not established

Thus, the Applicants submit that independent claim 1 and all claims depending therefrom are patentable over *Xu*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims be allowed.

35 U.S.C. §103

Claim 7

Claim 7 stands rejected under 35 U.S.C. § 103 as being unpatentable over *Xu* in view of *Lantsman* (US. Pat. 5,830,330). In response, the Applicants have amended claim 1 to more clearly recite certain aspects of the invention.

Independent claim 1 recites elements not taught or suggested *Xu* and *Lantsman*. The teaching of *Xu* has been discussed above. *Lantsman* teaches ramping up a power to a target in a processing chamber. However, *Lantsman* fails to teach or suggest a modification to *Xu* that would yield introducing a first gas through an first inlet port disposed proximate a sputtering target and introducing a second gas into the chamber through an second inlet port disposed proximate a surface of the substrate, as recited in claim 1. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 7 that depends from claim 1 is patentable over *Xu* and *Lantsman*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 7 allowed.

35 U.S.C. §103

Claim 14

Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Ngan* (US. Pat. 6,203,674). In response, the Applicants have amended claim 1 to more clearly recite certain aspects of the invention.

Independent claim 1 recites elements not taught or suggested *Xu* and *Ngan*. The teaching of *Xu* has been discussed above. *Ngan* teaches using a target made by titanium. However, *Ngan* fails to teach or suggest a modification to *Xu* that would yield introducing a first gas through an first inlet port disposed proximate a sputtering target and introducing a second gas into the chamber through an second inlet port disposed proximate a surface of the substrate, as recited in claim 1. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that submit that claim 14 that depends from claim 1 is patentable over *Xu* and *Ngan*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 14 be allowed.

35 U.S.C. §103

Claims 15-16

Claims 15-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* (US. Pat. 6,451,184). In response, the Applicants have amended claim 1 to more clearly recite certain aspects of the invention.

Independent claim 1 recites elements not taught or suggested *Xu* and *Sone*. The teaching of *Xu* has been discussed above. *Sone* teaches partitioning a gas space to have reactive gas contained between the partition member and a substrate. However, *Sone* fails to teach or suggest a modification to *Xu* that would yield introducing a first gas through an first inlet port disposed proximate a sputtering target and introducing a second gas into the chamber through an second inlet port disposed proximate a surface

of the substrate, as recited in claim 1. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claims 15-16 that depend from claim 1 are patentable over *Xu* and *Sone*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims be allowed.

35 U.S.C. §103**Claim 17**

Claim 17 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Gilboa* (US. Pat. 5,108,569). In response, the Applicants have amended claim 1 to more clearly recite certain aspects of the invention.

Independent claim 1 recites elements not taught or suggested *Xu* and *Gilboa*. The teaching of *Xu* has been discussed above. *Gilboa* teaches a shield ring disposed in a processing chamber to allow a gas to introduce therefrom. However, *Gilboa* fails to teach or suggest a modification to *Xu* that would yield introducing a first gas through an first inlet port disposed proximate a sputtering target and introducing a second gas into the chamber through an second inlet port disposed proximate a surface of the substrate, as recited in claim 1. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 17 that depends from claim 1 is patentable over *Xu* and *Gilboa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 17 be allowed.

35 U.S.C. §103**Claim 18**

Claim 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Chikako* (Japan 06-041733). In response, the Applicants have amended claims 1 and 18 to more clearly recite certain aspects of the invention.

Independent claim 1 recites elements not taught or suggested *Xu* and *Chikako*. The teaching of *Xu* has been discussed above. *Chikako* teaches introducing reactive gas through a central portion of a substrate holder disposed in a processing chamber. However, *Chikako* fails to teach or suggest a modification to *Xu* that would yield introducing a first gas through an first inlet port disposed proximate a sputtering target

and introducing a second gas into the chamber through an second inlet port disposed proximate a surface of the substrate, as recited in claim 1. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 18 that depends from claim 1 is patentable over *Xu* and *Chikako*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 18 be allowed.

35 U.S.C. §103

Claims 19-22 and 26

Claims 19-22 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Yamaguchi* (U.S. Patent 6,203,674). In response, the Applicants have amended claim 19 to more clearly recite certain aspects of the invention.

Independent claim 19 recites elements not taught or suggested *Xu*, *Sone* and *Yamaguchi*. The teachings of *Xu* and *Sone* have been discussed above. *Yamaguchi* teaches depositing a TiN film by sputtering a target containing Ti. However, *Yamaguchi* fails to teach or suggest a modification to *Xu* and *Sone* that would yield creating a higher partial pressure of an inert gas inside a vacuum chamber through a first inlet port disposed proximate a sputtering target disposed therein than at an upper surface of the substrate disposed in the vacuum chamber, and creating a higher partial pressure of an active gas introduced through a second inlet port disposed proximate the upper surface of the substrate, as recited in claim 19. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that independent claim 19 and claims 20-22 and 26 depending therefrom are patentable over *Xu*, *Sone* and *Yamaguchi*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims be allowed.

35 U.S.C. §103**Claim 23**

Claim 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Yamaguchi* and further in view of *Maniv* (US. Pat. 4,392,931) and further in view of *Ngan*. In response, the Applicants have amended claim 19 to more clearly recite certain aspects of the invention.

Independent claim 19 recites elements not taught or suggested *Xu*, *Sone*, *Yamaguchi*, *Maniv* and further in view of *Ngan*. The teachings of *Xu*, *Sone*, and *Yamaguchi* have been discussed above. *Maniv* teaches applying RF energy to a substrate disposed on a substrate support. *Ngan* teaches using a target made by titanium. However, *Maniv* and *Ngan* fail to teach or suggest a modification to *Xu*, *Sone*, and *Yamaguchi* that would yield creating a higher partial pressure of an inert gas inside a vacuum chamber through a first inlet port disposed proximate a sputtering target disposed therein than at an upper surface of the substrate disposed in the vacuum chamber, and creating a higher partial pressure of an active gas introduced through a second inlet port disposed proximate the upper surface of the substrate, as recited in claim 19. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 23 that depends from claim 19 is patentable over *Xu*, *Sone*, *Yamaguchi*, *Maniv* and further in view of *Ngan*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 23 be allowed.

35 U.S.C. §103**Claim 24**

Claim 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Yamaguchi* and further in view of *Ngan*. In response, the Applicants have amended claims 19 and 24 to more clearly recite certain aspects of the invention.

Independent claim 19 recites elements not taught or suggested *Xu*, *Sone*, *Yamaguchi* and further in view of *Gilboa*. The teachings of *Xu*, *Sone*, and *Yamaguchi* have been discussed above. *Gilboa* teaches a shield ring disposed in a processing chamber to allow a gas to introduce therefrom. However, *Gilboa* fails to teach or

suggest a modification to *Xu*, *Sone*, and *Yamaguchi* that would yield creating a higher partial pressure of an inert gas inside a vacuum chamber through a first inlet port disposed proximate a sputtering target disposed therein than at an upper surface of the substrate disposed in the vacuum chamber, and creating a higher partial pressure of an active gas introduced through a second inlet port disposed proximate the upper surface of the substrate, as recited in claim 19. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 24 that depends from claim 19 is patentable over *Xu*, *Sone*, *Yamaguchi* and further in view of *Gilboa*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 24 be allowed.

35 U.S.C. §103

Claim 25

Claim 25 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Yamaguchi* and further in view of *Chikako*. In response, the Applicants have amended claims 19 and 25 to more clearly recite certain aspects of the invention.

Independent claim 19 recites elements not taught or suggested *Xu*, *Sone*, *Yamaguchi* and further in view of *Chikako*. The teachings of *Xu*, *Sone*, and *Yamaguchi* have been discussed above. *Chikako* teaches introducing reactive gas through a central portion of a substrate holder disposed in a processing chamber. However, *Chikako* fails to teach or suggest a modification to *Xu*, *Sone*, and *Yamaguchi* that would yield creating a higher partial pressure of an inert gas inside a vacuum chamber through a first inlet port disposed proximate a sputtering target disposed therein than at an upper surface of the substrate disposed in the vacuum chamber, and creating a higher partial pressure of an active gas introduced through a second inlet port disposed proximate the upper surface of the substrate, as recited in claim 19. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 25 that depends from claim 19 is patentable over *Xu*, *Sone*, *Yamaguchi* and further in view of *Chikako*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 25 be allowed.

35 U.S.C. §103**Claim 27**

Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Ngan* and further in view of *Yamaguchi*. In response, the Applicants have amended claim 27 to more clearly recite certain aspects of the invention.

Independent claim 27 recites elements not taught or suggested *Xu*, *Sone*, *Ngan*, and *Yamaguchi*. The teachings of *Xu* and *Sone* have been discussed above. *Yamaguchi* teaches depositing a TiN film by sputtering a target containing Ti. *Ngan* teaches using a target made by titanium. However, *Ngan* and *Yamaguchi* fail to teach or suggest a modification to *Xu* and *Sone* that would yield introducing a gas mixture into a vacuum chamber through a first inlet port disposed proximate a sputtering target disposed inside the vacuum chamber, introducing a second gas into the chamber through a second inlet port disposed proximate the upper surface of the substrate, as recited by claim 27. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that independent claim 27 is patentable over *Xu*, *Sone*, *Ngan* and further in view of *Yamaguchi*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 27 be allowed.

35 U.S.C. §103**Claims 28-31**

Claims 28-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Takehara* (U.S. Patent 5,340,459) and further in view of *Yamaguchi*. In response, the Applicants have amended claim 28 to more clearly recite certain aspects of the invention.

Independent claim 28 recites elements not taught or suggested *Xu*, *Sone*, *Takehara*, and *Yamaguchi*. The teachings of *Xu* and *Sone* have been discussed above. *Takehara* teaches a pipe adapted to introduce gas into a processing chamber near a substrate. *Yamaguchi* teaches depositing a TiN film by sputtering a target containing Ti. However, *Takehara* and *Yamaguchi* fail to teach or suggest a modification to *Xu* and *Sone* that would yield introducing a gas mixture into a vacuum chamber through a first

inlet port disposed proximate a sputtering target disposed inside the vacuum chamber, and introducing a second gas into the chamber through a second inlet port disposed proximate the upper surface of the substrate, as recited by claim 28. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that independent claim 28 and claims 29-31 depending therefrom are patentable over *Xu, Sone, Takehara* and further in view of *Yamaguchi*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and the claims be allowed.

35 U.S.C. §103**Claim 32**

Claim 32 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Xu* in view of *Sone* and in view of *Takehara* and in view of *Yamaguchi* and further in view of *Ngan*. In response, the Applicants have amended claim 28 to more clearly recite certain aspects of the invention.

Independent claim 28 recites elements not taught or suggested *Xu, Sone, Takehara, Yamaguchi* and *Ngan*. The teachings of *Xu, Sone, Takehara* and *Yamaguchi* have been discussed above. *Ngan* teaches using a target made by titanium. However, *Ngan* fail to teach or suggest a modification to *Xu, Sone, Takehara* and *Yamaguchi* that would yield introducing a gas mixture into a vacuum chamber through a first inlet port disposed proximate a sputtering target disposed inside the vacuum chamber, and introducing a second gas into the chamber through a second inlet port disposed proximate the upper surface of the substrate, as recited by claim 28. As such, a *prima facie* case of obviousness has not been established as the references fail to teach or suggest each claimed element.

Thus, the Applicants submit that claim 32 that depends from is patentable over *Xu, Sone, Takehara* and *Yamaguchi* and further in view of *Ngan*. Accordingly, the Applicants respectfully request that the rejection be withdrawn and claim 32 be allowed.

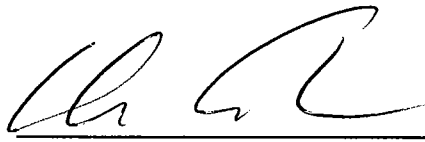
CONCLUSION

Thus, for at least the reasons discussed above, the Applicants submit that all claims now pending are in condition for allowance. Accordingly, both reconsideration of this application and swift passage to issue are earnestly solicited.

If the Examiner believes that any unresolved issues still exist, it is requested that the Examiner telephone Keith Taboada at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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Date



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